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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,143	11/09/2000	Udo Bub	P00,1797	1920

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EXAMINER

LEWIS, MICHAEL A

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 11/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

KS

Office Action Summary

Application No.

09/700,143

Applicant(s)

BUB ET AL.

Examiner

Lewis A Michael

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/09/00.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7-9,11-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7-9,11 and 12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

3. The drawings are objected to under 37 CFR 1.83(a) because it fails to show all details in feature extraction such as windowing operation as discussed in specifications. Also, details as described in the specification related to the splitting algorithm should either be included in the drawing or shown in a new detail drawing. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The title of the invention is not sufficiently descriptive. A new title is required that is more clearly indicative of the invention to which the claims are directed. The following title is suggested: A Method and Apparatus for an adaptive speech recognition system utilizing HMM models.

Claim Objections

1. Claim 7 (d) is objected to because of the following informalities: "adopt.." should be replaced with "adapt...." Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1, 4, 5, 7, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al. (IEEE ICASSP'92), et al. in view of Hwang et al. (U.S. Patent 6141641).

As per Claims 1 & 7, Takami et al. disclose the use of a speech recognition system *[also executed on a processor or computer]* that

- a. Digitalizes a voice signal (Col 6, pg 575)
- b. Extracts features (Col 6, pg 575)
- c. Uses imaging of features in an acoustical model that utilizes HMM as a basis to model speech (Col 6, pg 575)
- d. A global search that produces a recognized word sequence (Col 6, pg 575).

Takami et al. show items a, b, c and d, but do not show the modifying codebook based on the use of entropy as a measure for splitting the probability density function. However, Hwang et al. teach the modification of the codebook based on the use of entropy as a measure (Col8, lines29 - 40). Entropy gives the uncertainty in a prediction of a statistical event. Hwang et al. use it to determine the likelihood of generating data aligned to an output distribution (Col 10, lines 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to modify Takami et al. with the use of entropy for the splitting of the probability density function as taught by Hwang et al. in order to efficiently provide new regions in the feature space that provided improved speech recognition.

Regarding claim 4, the modified Takami et al. show the use of a 2-mixture gaussian probability function (Col1, pg 574).

Regarding Claims 5, the modified Takami et al. show splitting of states of a probability functions by the use of entropy. The concept of splitting the probability density functions or modes by the approximation, where for a large number of random samples, the standard deviations are equal and the means are different is logical. The standard deviation of the probability density functions is not expected to change significantly since the scatter conditions is not expected to change significantly between modes. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made not to equate the mean since it is the only way to distinguish new modes.

Regarding Claim 9, the main purpose of the modified Takami et al. algorithm is the determination of the model architecture and parameters simultaneously. This

algorithm will improve on the speed and efficiency of a speech recognition system and give a faster execution time.

Regarding Claim 11, the modified Takami et al. disclose a successive state splitting algorithm (pg 574, Col1).

2. Claims 3,10 & 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al. (IEEE ICASSP'92) in view of Hwang et al. (U.S. Patent 6141641) as applied to claim 1 or 7 above, and further in view of Phillip et al (U.S. Patent 6501833).

Regarding Claim 3, the modified Takami et al. show the use of splitting of the probability density functions by the use of entropy as a means of training/updating codebooks. The modified Takami et al. do not show the modification of a large vocabulary by the dynamic addition of new words. However, Phillips et al. teach "The speech recognition system for dynamically adding words to an active portion of a total vocabulary ... ", (Col 14, lines 5 – 45). The adaptive or dynamic capability of a speech recognition system gives the advantages of the rapid and efficient addition of new words to a system's active vocabulary.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify the modified Takami et al. with the dynamic addition of new words to create a large vocabulary as taught by Phillips in order to develop an online speech recognition application.

Regarding Claim 10, the modified Takami et al. show the use of splitting of the probability density functions by the use of entropy as a means of training/updating codebooks. The modified Takami et al. do not teach a method of adapting to a speaker pronunciation. However, Phillips et al. teach "A method for producing a word pronunciation network ... a pre-established active vocabulary...word is selected from a base form pronunciation" (Col4, line 54 - Col15, line 65). The adaptive or dynamic capability of a speech recognition system gives the advantages of the rapid and efficient addition of new speaker pronunciations to a system's active vocabulary.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify the modified Takami et al. by the splitting of the probability density functions for 'online' adaptation as taught by Phillips et al. in order to develop a dynamic speech recognition system.

Regarding Claim 12, the Takami et al. show the use of splitting of the probability density functions by the use of entropy as a means of training/updating

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codebooks. The modified Takami et al. do not show a method for dynamic adaptation of a speech recognition system. However, Phillips et al. teach a "Method and Apparatus for Dynamic Adaptation of Large Vocabulary speech recognition system and for use of constraints from a database in a large vocabulary speech recognition system"(Title). The adaptive or dynamic speech recognition system is executed on an apparatus comprising of a processor or a computer.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify the modified Takami et al. for 'online' adaptation as taught by Phillips et al. in order to develop a dynamic speech recognition application that is executed on a processor.

Conclusion

12. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872 9314,

(for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal

Drive, Arlington, VA., Sixth Floor (Receptionist).

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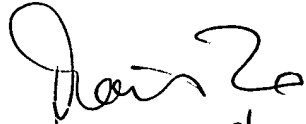
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Lewis, telephone number (703)305-8730.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Doris To, can be reached at (703)305-4827. The facsimile phone number for this group is (703)872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group 2600 receptionist whose telephone number is (703) 305-4750, the 2600 Customer Service telephone number is (703) 306-0377.

mal

10/9/2003


DORIS H. TO 10/30/03
SUPERVISORY PATENT EXAMINER
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